

Atty. Docket No.: SIG000108

Patent Application No. 10/718,769

Rejections Under 35 USC § 102

Claims 1, 2, 4, 5, 7, 12-15, 18 and 19 stand rejected under 35 U.S.C. 102(e) as being anticipated by US 6,674,185 B2 (MIZUTA). The examiner states:

MIZUTA discloses a digital thermometer for measuring a temperature of an off-chip device that comprises: an on-chip programmable current source (20; see Figs. 2 and 4A; Col. 3, Lines 53-62) to provide a current output (IF); an analog-to-digital converter 50 (Col. 5, Lines 49-52) operably coupled to sample a temperature-dependent voltage output VF produced by a temperature dependent resistive device (diode 31, in the embodiment of Fig. 2) and the current output IF and convert the temperature-dependent voltage output to a digital value (Col. 4, Lines 63-67); and a processing module that receives the digital value and equates the digital value to the temperature of the off-chip device as claimed by Applicant in Claim 12.

MIZUTA discloses the method for sensing a temperature of a device, as claimed by Applicant in claim 1, which is met in the normal operation of the digital thermometer as described above regarding Claim 12, as the disclosed thermometer is disclosed as establishing a programmable current IF for an on-chip current source 20; sensing a temperature-dependant voltage VF that is based on a temperature dependent resistive device 31 and the programmable current, wherein the temperature dependent resistive device is thermally coupled to the device; converting the temperature-dependant voltage to a digital value; and equating the digital value to the temperature of the device. MIZUTA does not explicitly disclose that the temperature dependent resistive device is thermally coupled to the device as claimed in Claim 1. The temperature dependent resistive device will be inherently be thermally coupled to whatever device it is used in for sensing the temperature of that device.

Further regarding Claims 2, 7 and 13: MIZUTA discloses the processing module (e.g., see Fig. 4C) directs the on-chip programmable current source to: increase the current output (Col. 6, Lines 49-57) if the digital value decreases below a lower threshold value; and decrease the current output (Col. 6, Lines 61-66) if the

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digital value increases above an upper threshold value. The method of claim 1 further comprises adjusting the programmable current such that the temperature-dependent voltage is within a predetermined range of values, the device being trimmed for temperature values in a desired temperature range, for converting the temperature-dependent voltage into the digital value, wherein the equating of the digital value is further based on the adjusting of the programmable current.

Further regarding Claims 14 and 15: MIZUTA discloses the analog-to-digital converter comprises a comparator (51); and the processing module auto-ranges the on-chip programmable current source so that the current output produces the temperature-dependent voltage output within a predetermined range,

Further regarding Claims 4 and 18: MIZUTA discloses the method and apparatus wherein the processing module equates the digital value to the temperature of the device further comprises determining the temperature of the device from a table (e.g., Fig. 5B) relating digital values to temperatures.

Further regarding Claim 5 and 19, MIZUTA discloses equating the digital value to the temperature of the off-chip device further comprises calculating the temperature of the off-chip device with a predetermined function wherein the temperature is a function of: at least one property of the programmable current; a digitized voltage; and a set of physical properties of the temperature dependent resistive device.

Applicant submits that MIZUTA fails to teach or suggest the invention recited in the Claims. The applicant respectfully submits that MIZUTA can be clearly distinguished from the instant application. The applicant submits that MIZUTA teaches a way of determining a function associated with a temperature sensor wherein the current of the associated temperature sensor is adjusted in order to produce an ideal voltage output as illustrated in FIG. 3 of MIZUTA. MIZUTA teaches that the temperature may be set to specific points wherein the voltage output of the temperature sensing circuit is an ideal temperature voltage output.

The present invention differs as evidenced in original claim 2 wherein the temperature dependent voltage as sensed is adjusted with a programmable current when the temperature

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dependent voltage is not within a predetermined range of values used to convert the temperature with dependent voltage into a digital value. This range is based on the resolution of the analog to digital converter, not necessarily on the temperature. MIZUTA adjusts the current such that the voltage sense at a predetermined temperature is equal to an ideal voltage. Thus MIZUTA does not take full advantage of the resolution of the analog to digital converter. MIZUTA further teaches that the temperature may be known in order to determine the function associated with the temperature sensor. The present invention maintains the output of the analog to digital converter within a predetermined range to take full advantage of the resolution while MIZUTA adjusts the current in order to achieve the predetermined voltage for a predetermined temperature. Therefore, the applicant respectfully submits that MIZUTA and instant applicant may clearly be distinguished.

Additionally MIZUTA fails to teach that the current source may be an on-chip device as recited in the independent Claims. By having an on-chip power supply current source power supply noises issues are reduced or eliminated thus the present invention is able to provide an on-chip circuit operable to sense a wide temperature range with a reduced external part count. The applicant respectfully submits that these two issues are not specifically addressed by MIZUTA.

The applicant respectfully traverses the examiner's arguments that MIZUTA discloses or directs the on-chip programmable current source to increase the current output if the digital value decreases below a lower threshold value or decrease the current output if the digital value increases above an upper threshold value. The instant application adjusts the programmable current such that the voltage falls within a predetermined range. MIZUTA adjusts the current source such that a predetermined voltage, an ideal voltage, is realized for a predetermined temperature. There is no range of values associated with MIZUTA. Thus, the applicant respectfully submits that the rejection based on MIZUTA is not proper.

As such, Applicant respectfully requests the Examiner withdraw the rejections and allow Claims 1, 2, 4, 5, 7, 12-15, 18 and 19.

Rejections Under 35 USC § 103

Applicant respectfully points out that in order to combine references for an obviousness rejection, there must be some teaching, suggestion or incentives supporting the combination. *In*

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re Laskowski, 871 F.2d 115, 117, 10 U.S.P.Q. 2d 1397, 1399 (Fed. Cir. 1989). The mere fact that the prior art could be modified does not make that modification obvious unless the prior art suggests the desirability of the modification. *In re Gordon*, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). In addition, it is well established that Applicant's disclosure cannot be used to reconstruct Applicant's invention from individual pieces found in separate, isolated references. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q. 2d 1596 (Fed. Cir. 1988).

Claims 3, 6, 17, and 20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over MIZUTA in view of US 4,161,880 A (PROSKY). The examiner states:

MIZUTA, to summarize, discloses all the limitations as claimed by Applicant in Claims 3, 6, 17, and 20 as described above in Paragraph 3 as applied to Claims 1, 2, 4, 5, 7, 12-15, 18 and 19, further including the temperature detecting circuit may be a diode or a transistor.

MIZUTA as described above, does not disclose that the temperature detecting circuit may include a thermistor as claimed by Applicant in Claims 3, 6, 17, and 20, and wherein the temperature is calculated from the function as claimed in Claims 6 and 20.

PROSKY discloses a digital thermometer employing a current source 16 for applying current to a thermistor 12, in order to create a voltage directly related to its temperature (Col. 3, Lines 20-45), and to calculate the temperature value using a well-known equation having a negative logarithmic relationship (Col. 4, Lines 1-30).

PROSKY is evidence that ordinary workers in the field of thermometry would recognize the benefit of substituting a thermistor as taught by PROSKY for the diode thermometer of MIZUTA in order to indicate a numerical value of temperature using a logarithmic equation. Moreover, it is well known in the art to use a logarithmic equation for modeling the temperature dependence of a thermistor. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute a thermistor for the diode in the thermometer of MIZUTA and to use a logarithmic equation since the device is nonlinear in order to calculate the numerical value of temperature as taught by MIZUTA.

Applicant respectfully submits that there is no motivation, teaching or suggestion to combine MIZUTA with PROSKY. Therefore, the rejection on a combination of these references

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is inappropriate. Withdrawal of the rejection allowance of Claims 3, 6, 17, and 20 respectfully requested.

Applicant further submits that neither MIZUTA or PROSKY alone nor the combination of the two teaches or suggests make obvious the invention recited in the Claims because the cited references do not disclose a maintaining the sensed voltage within a predetermined range. Rather Mizuta maintains the voltage at an ideal voltage for a predetermined temperature. This requires prior knowledge of the temperature.

The present invention differs wherein the temperature dependent voltage as sensed is adjusted with a programmable current when the temperature dependent voltage is not within a predetermined range of values used to convert the temperature with dependent voltage into a digital value. This range is based on the resolution of the analog to digital converter, not necessarily on the temperature. MIZUTA adjusts the current such that the voltage sense at a predetermined temperature is equal to an ideal voltage. Thus MIZUTA does not take full advantage of the resolution of the analog to digital converter. The present invention maintains the output of the analog to digital converter within a predetermined range to take full advantage of the resolution while MIZUTA adjusts the current in order to achieve the predetermined voltage for a predetermined temperature. Therefore, the applicant respectfully submits that MIZUTA and instant applicant may clearly be distinguished.

Additionally MIZUTA fails to teach that the current source may be an on-chip device as recited in the independent Claims. By having an on-chip power supply current source power supply noises issues are reduced or eliminated thus the present invention is able to provide an on-chip circuit operable to sense a wide temperature range with a reduced external part count. The applicant respectfully submits that these two issues are not specifically addressed by MIZUTA.

Thus, the applicant respectfully submits that the rejection based on MIZUTA is not proper. Applicant, therefore, respectfully requests the Examiner to reconsider and withdraw the rejection to allow Claim 3, 6, 17, and 20.

Claims 8, 9, 22, and 23 stand rejected under 35 U.S.C. 103(a) as being unpatentable over MIZUTA in view of US 5,459,671A (DULEY).

MIZUTA, to summarize, discloses all the limitations as claimed by Applicant in Claims 8, 9, 22, and 23 as described above in Paragraph 3 as applied to Claims 1, 2,

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4, 5, 7, 12-15, 18 and 19. MIZUTA as described above, does not disclose that the temperature detecting circuit is thermally coupled to an off-chip device being at least one of a hard drive and a battery and when the device is a battery, controlling a charge function of the battery based on the temperature of the battery.

DULEY discloses a battery controller that includes a temperature sensor, under control of a microcontroller. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to thermally couple the temperature sensor device of MIZUTA to an off-chip device in order to control a charge function of the battery based on the temperature of the battery as taught by DULEY.

Applicant respectfully submits that there is no motivation, teaching or suggestion to combine MIZUTA with DULEY. Therefore, the rejection on a combination of these references is inappropriate. Withdrawal of the rejection and allowance of Claims 8, 9, 22, and 23 is respectfully requested.

Applicant further submits that neither MIZUTA or DULEY alone nor the combination of the two teaches or suggests make obvious the invention recited in the Claims because the cited references do not disclose a maintaining the sensed voltage within a predetermined range. Rather Mizuta maintains the voltage at an ideal voltage for a predetermined temperature. This requires prior knowledge of the temperature.

The present invention differs wherein the temperature dependent voltage as sensed is adjusted with a programmable current when the temperature dependent voltage is not within a predetermined range of values used to convert the temperature with dependent voltage into a digital value. This range is based on the resolution of the analog to digital converter, not necessarily on the temperature. MIZUTA adjusts the current such that the voltage sense at a predetermined temperature is equal to an ideal voltage. Thus MIZUTA does not take full advantage of the resolution of the analog to digital converter. The present invention maintains the output of the analog to digital converter within a predetermined range to take full advantage of the resolution while MIZUTA adjusts the current in order to achieve the predetermined voltage for a predetermined temperature. Therefore, the applicant respectfully submits that MIZUTA and instant applicant may clearly be distinguished.

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Additionally MIZUTA fails to teach that the current source may be an on-chip device as recited in the independent Claims. By having an on-chip power supply current source power supply noises issues are reduced or eliminated thus the present invention is able to provide an on-chip circuit operable to sense a wide temperature range with a reduced external part count. The applicant respectfully submits that these two issues are not specifically addressed by MIZUTA.

Thus, the applicant respectfully submits that the rejection based on MIZUTA is not proper. Applicant, therefore, respectfully requests the Examiner to reconsider and withdraw the rejection to allow Claim 8, 9, 22, and 23.

Claims 8, 10 and 21 stand rejected under 35 U.S.C. 103(a) as being unpatentable over MIZUTA in view of US 6,092,926 A (STILL et al., hereinafter STILL).

MIZUTA, to summarize, discloses all the limitations as claimed by Applicant in Claims 8, 10 and 21 as described above in Paragraph 3 as applied to Claims 1, 2, 4, 5, 7, 12-15, 18 and 19. MIZUTA as described above, does not disclose that the temperature detecting circuit is thermally coupled to an off-chip device being at least one of a hard drive and a battery and when the device is a harddrive, controlling the harddrive based on the temperature of the harddrive.

STILL discloses a device that includes a thermistor or thermocouple temperature sensor that is thermally coupled to the off-chip device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to thermally couple the temperature sensor device of MIZUTA to an off-chip harddrive device in order to control the harddrive based on the temperature of the battery as taught by STILL.

Applicant respectfully submits that there is no motivation, teaching or suggestion to combine MIZUTA with STILL. Therefore, the rejection on a combination of these references is inappropriate. Withdrawal of the rejection and allowance of Claims 8, 10 and 21 is respectfully requested.

Applicant further submits that neither MIZUTA or STILL alone nor the combination of the two teaches or suggests make obvious the invention recited in the Claims because the cited references do not disclose a maintaining the sensed voltage within a predetermined range.

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Rather Mizuta maintains the voltage at an ideal voltage for a predetermined temperature. This requires prior knowledge of the temperature.

The present invention differs wherein the temperature dependent voltage as sensed is adjusted with a programmable current when the temperature dependent voltage is not within a predetermined range of values used to convert the temperature with dependent voltage into a digital value. This range is based on the resolution of the analog to digital converter, not necessarily on the temperature. MIZUTA adjusts the current such that the voltage sense at a predetermined temperature is equal to an ideal voltage. Thus MIZUTA does not take full advantage of the resolution of the analog to digital converter. The present invention maintains the output of the analog to digital converter within a predetermined range to take full advantage of the resolution while MIZUTA adjusts the current in order to achieve the predetermined voltage for a predetermined temperature. Therefore, the applicant respectfully submits that MIZUTA and instant applicant may clearly be distinguished.

Additionally MIZUTA fails to teach that the current source may be an on-chip device as recited in the independent Claims. By having an on-chip power supply current source power supply noises issues are reduced or eliminated thus the present invention is able to provide an on-chip circuit operable to sense a wide temperature range with a reduced external part count. The applicant respectfully submits that these two issues are not specifically addressed by MIZUTA.

Thus, the applicant respectfully submits that the rejection based on MIZUTA is not proper. Applicant, therefore, respectfully requests the Examiner to reconsider and withdraw the rejection to allow Claim 8, 10 and 21.

Claims 11 and 16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over MIZUTA in view of US 6,240,371 A (AZAR).

MIZUTA, to summarize, discloses all the limitations as claimed by Applicant in Claims 11 and 16 as described above in Paragraph 3 as applied to Claims 1, 2, 4, 5, 7, 12-15, 18 and 19. MIZUTA as described above, does not disclose a multiplexer that multiplexes the programmable current to a plurality of temperature dependent resistive devices thermally coupled to a plurality of devices; a demultiplexer that demultiplexes a plurality of temperature-dependant voltages to the analog-to-digital converter converting each temperature-dependant voltage to a digital value; and

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equating each digital value to the temperature of each of the plurality of off-chip and/or on-chip devices.

AZAR discloses (Figs. 3-4) a device for measuring a plurality of temperatures by using a multiplexer and a demultiplexer enabling a plurality of temperature-dependent voltages to be demultiplexed to the analog-to-digital converter converting each temperature-dependent voltage to a digital value, representative of temperature. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add a multiplexer and demultiplexer to the thermometer of MIZUTA in order to enable measurement of the numerical value of a plurality of devices as taught by AZAR.

Applicant respectfully submits that there is no motivation, teaching or suggestion to combine MIZUTA with AZAR. Therefore, the rejection on a combination of these references is inappropriate. Withdrawal of the rejection allowance of Claims 11 and 16 respectfully requested.

Applicant further submits that neither MIZUTA or AZAR alone nor the combination of the two teaches or suggests make obvious the invention recited in the Claims because the cited references do not disclose a maintaining the sensed voltage within a predetermined range. Rather Mizuta maintains the voltage at an ideal voltage for a predetermined temperature. This requires prior knowledge of the temperature.

The present invention differs wherein the temperature dependent voltage as sensed is adjusted with a programmable current when the temperature dependent voltage is not within a predetermined range of values used to convert the temperature with dependent voltage into a digital value. This range is based on the resolution of the analog to digital converter, not necessarily on the temperature. MIZUTA adjusts the current such that the voltage sense at a predetermined temperature is equal to an ideal voltage. Thus MIZUTA does not take full advantage of the resolution of the analog to digital converter. The present invention maintains the output of the analog to digital converter within a predetermined range to take full advantage of the resolution while MIZUTA adjusts the current in order to achieve the predetermined voltage for a predetermined temperature. Therefore, the applicant respectfully submits that MIZUTA and instant applicant may clearly be distinguished.

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Additionally MIZUTA fails to teach that the current source may be an on-chip device as recited in the independent Claims. By having an on-chip power supply current source power supply noises issues are reduced or eliminated thus the present invention is able to provide an on-chip circuit operable to sense a wide temperature range with a reduced external part count. The applicant respectfully submits that these two issues are not specifically addressed by MIZUTA.

Thus, the applicant respectfully submits that the rejection based on MIZUTA is not proper. Applicant, therefore, respectfully requests the Examiner to reconsider and withdraw the rejection to allow Claim 11 and 16.

REMARKS

Claims 1, 5, 8, 20 and 33 stand objected to because of informalities. These Claims have been amended to overcome the examiner's objections. As such, Applicant respectfully requests the Examiner withdraw the rejections and allow Claims 1, 5, 8, 20 and 33.

Applicant appreciates the time taken by the Examiner to review Applicant's present application. This application has been carefully reviewed in light of the Official Action mailed January 11, 2005. Applicant respectfully requests reconsideration and favorable action in this case.

CONCLUSION

Applicant has now made an earnest attempt to place this case in condition for allowance. For the foregoing reasons and for other reasons clearly apparent, Applicant respectfully requests full allowance of Claims 1-~~36~~

While Applicants believe no fee is due with this transmission, if any fees are due, the Commissioner is hereby authorized to charge Deposit Account No. 50-2126 of Garlick, Harrison and Markison.

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Respectfully submitted,

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